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RAPTOR MITIGATION PROGRAM

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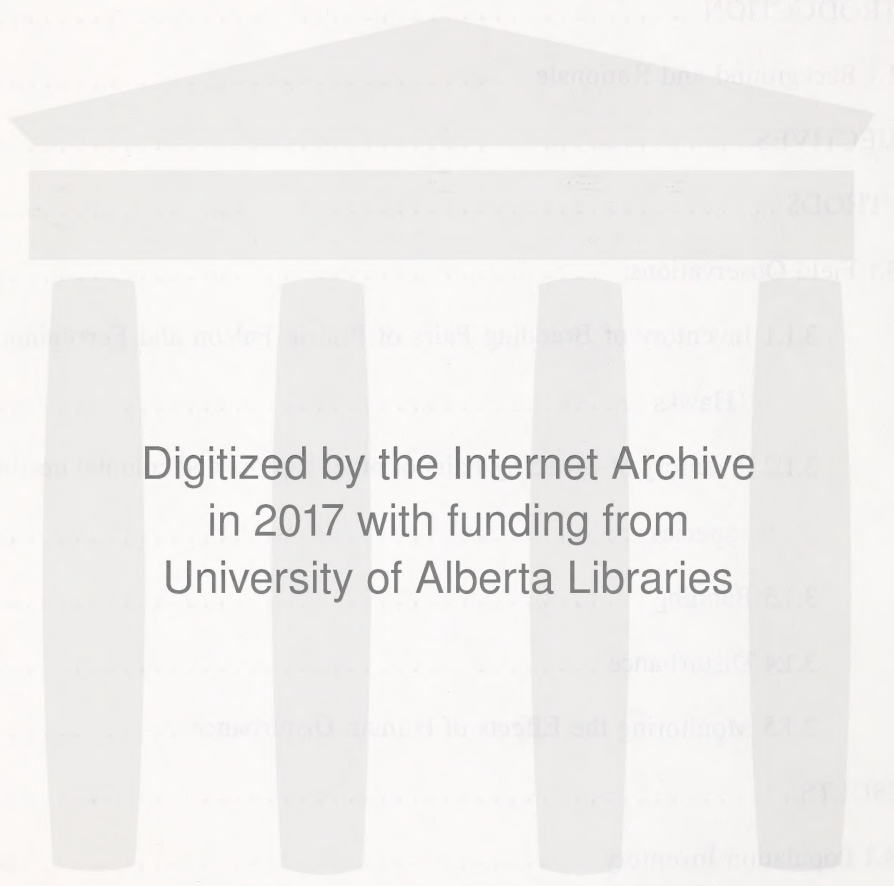
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Executive Summary

This is the fifth report on the raptor mitigation project relative to the impact of the Oldman River Dam on breeding populations of Prairie Falcons *Falco mexicanus* and Ferruginous Hawks *Buteo regalis*. Both species occur and nested in areas impacted by the construction and flooding of the dam.

In the current year approximately 650 hours were spent in the field observing these birds. Eleven Prairie Falcon and five Ferruginous Hawk breeding territories were occupied and monitored during the 1993 breeding season. Eight pair of Prairie Falcons nested, however only four pair were successful fledging a total of eighteen young. Three of the five pair of Ferruginous Hawks fledged nine young. All young were caught and banded. In addition one pair of Golden Eagles *Aquila chrysaetos* nested and seventeen Red-tail Hawk *Buteo jamaicensis* nests were recorded within the study area.

Severe disturbance was documented in association with three prairie falcon and one Golden Eagle nesting territory in the current breeding season. Two of the prairie falcon territories were in close proximity to the Dam and were subjected to intense human activity. The third territory was located on the reservoir and was subjected to regular disturbance by passing motor boats. The Golden Eagles were disturbed by power boats in close proximity to the nest during incubation and deserted after the second day of this activity.

Seven artificial holes were occupied during the 1992 breeding season, five by Prairie Falcons, and one each by Canada Geese *Branta canadensis*, and Great Horned Owls *Bubo virginianus*. Three nesting platform were utilized, one by Red-tailed Hawks and two by

Canada Geese. Several nest boxes were occupied by American Kestrels, Falco spaverius, Mountain Bluebirds Sialia currucoides, Tree Swallows Tachycineta bicolor, Barrow's Goldeneye Bucephala islandica, and apparently by Wood Duck Aix sponsa, and Hooded Merganser Lophodytes cucullatus

Three additional raptor species, Swainson's Hawk Buteo Swainsonii, Northern Harrier Circus cyaneus and Richardson's Merlin Falco columbarius richardsoni nested in the study area on the banks of the Reservoir. Short-eared Owl Aseo flameus, Cooper's Hawk Accipiter cooperii and Sharp-shinned Hawks Accipiter striatus were observed near the reservoir but were not found nesting

1.0 INTRODUCTION

1.1 Background and Rationale

The Oldman River Dam and surrounding area supports one of the principle concentrations of breeding Prairie Falcons in Alberta. This population has been monitored since the late 1960's and intensively studied since 1989 (Table 1.). The area also maintains a good population of Red-tailed Hawks, American Kestrels, Great Horned Owls, and a few pair of Ferruginous Hawks and Golden Eagles.

The construction and subsequent flooding of the Oldman River Dam impacted on the several pair of Prairie Falcons, American Kestrels, Red-tailed Hawks, Great Horned Owls and on the one pair of Ferruginous Hawks nesting in, or adjacent to the reservoir. With the completion of the dam the majority of these breeding birds have now relocated to alternate natural and artificial nest sites in the area.

In 1991-92 environmental hearings were held by a Federal Environmental Panel throughout the province. Several concerns were addressed and several recommendations were made. This project has been carried out in response to the recommendation that the monitoring of the environmental impact on the wildlife in the area should be continued. The project relates specifically to the necessity to monitor several species of sensitive birds nesting in association with the reservoir.

During the construction phase several pair of raptorial birds nesting in and adjacent to the Oldman River valley were displaced by human activity and habitat alteration

associated with the construction and subsequent flooding of the Oldman River Dam¹. However, as a result of mitigation and the continuing remoteness of the area no less than ten species of raptorial birds including Prairie Falcon, Richardson's Merlin, Golden Eagle and Ferruginous Hawk are still found nesting in the area. In addition, the newly created nesting and feeding areas has already served to attract a large number of sensitive colonial water birds².

With the completion of the dam, unrestricted boating and other recreational activity has the potential for subjecting the remaining resident raptors and any colonial birds to severe disturbance throughout the breeding season. As a result there is a very real potential that most, or at the extreme, all of these species will simply abandon the area. The potential for serious conflict could be very real. However, the area is large enough with sufficient diversity to support both the majority of the recreational activities and a healthy wildlife component. In order to achieve this, continued intensive monitoring and good public relations will be required to; a) establish realistic guidelines and b) develop the regulations required to maintain the wildlife resource. With realistic guidelines and regulations there is an excellent potential for many aspects of EcoTourism as well as recreational boating and fishing.

¹ Prairie Falcon *Falco mexicanus*, Ferruginous Hawk *Buteo regalis*, Red-tailed Hawk *Buteo jamaicensis*, American Kestrel *Falco sparverius* and Great Horned Owl *Bubo virginianus*.

² All of the following species have been observed on the reservoir and could begin to colonize: Canada Goose *Branta canadensis*, Common Tern *Sterna hirundo*, Black Tern *Chlidonias niger*, California Gull *Larus californicus*, Ring-billed Gull *Larus delawarensis*, Western Grebe *Aechmophorus occidentalis*, Eared Grebe *Podiceps caspicus*, Double-crested Cormorant *Phalacrocorax auritus*, White Pelican *Pelicanus erythrorhynchos*.



2.0 Objectives

1. Protect and maintain the existing breeding Prairie Falcons, other raptors living in and associated with, the area impacted by the construction and flooding of the Oldman River Dam.
2. To protect and maintain highly visible and sensitive colonial nesting species that colonize the reservoir.
3. To minimize disturbance and resulting nest loss to raptorial and colonial waterbirds resulting from construction or recreation related activities through the development of realistic guidelines for Multiple Use of the area in cooperation with Alberta Fish and Wildlife, Alberta Parks and Recreation and Alberta Departments of Public Works and Environment,
4. To monitor nesting biology, phenology and response to disturbance by raptorial and colonial water birds nesting in and associated with the area impacted by the construction and flooding of the Oldman River Dam.
5. To maintain public support through good public relations, ie. keeping the local public informed, working closely with the government departments, the media, local committees, and where possible involving the public in activities related to the project.



3.0 Methods

3.1 Field Observations:

3.1 Monitoring nesting raptorial birds and colonial waterbirds

The primary purpose of the project is to minimize the effect of human disturbance on sensitive raptors and colonial birds nesting on or adjacent to the reservoir. In order to provide the necessary biological data, monitoring was carried out to obtain specific documentation on the breeding biology of the species of concern. The documentation included such aspects as; arrival dates, initiation of nesting, egg laying, hatching and fledging dates and response to specific types of disturbance.

Similarly to measure the effects of human interference the frequency, timing, duration and location of each type of recreational activity carried out near nesting areas of sensitive species were documented. Also noted when possible were the effects of the various types of human activity in relation to the breeding birds with specific reference to the nature of the activity, the relative distance from nest sites and the response of these birds in relation to the timing in the breeding cycle.

Monitoring was carried out from the beginning of April through June for both raptors and colonial species in order to provide data on initial occupancy and the extent of human interference at this critical time. Once nesting territories were established and nesting was initiated regular visits were then made to all documented sites and all relevant observations recorded and problems investigated. Specific attention was paid to areas with high recreational traffic and all observed interaction recorded. Immature Prairie Falcons and

Ferruginous Hawks were banded and field monitoring was continued until the fledging of the young and the nest success was recorded.

3.1.1 Inventory of Breeding Pairs of Prairie Falcon, Ferruginous Hawks and Colonial Species

As detailed in my earlier reports the initial raptor inventories relative to the Oldman River Dam were carried out as part of the Oldman River Wildlife Investigations in the spring and summer of 1985. These inventories located four breeding pair of Prairie Falcons and one pair of Ferruginous Hawks within the proposed reservoir boundaries. Three additional pair of falcons and two pair of Ferruginous Hawks were located upstream and downstream of the proposed reservoir. (Young et al. March 86). Raptor breeding inventories and behavioral studies have been carried out from March through July in 1989, 1990, 1991 and 1992 and from the beginning of April through the end of June in 1993. These field investigations were carried out specifically to locate breeding pairs, non breeding pairs and individuals occupying known breeding territories, or suitable nesting habitat within 16 km. of the proposed reservoir boundaries.

3.1.2 Inventory of Breeding Pairs of other raptors and colonial nesting species

Incidental to the monitoring of Prairie Falcons and Ferruginous Hawks other raptor species were inventoried and their nests plotted for future investigation. As a result of the flooding of the dam and the influx of other species into the area, specific attention was paid to the presence of sensitive Colonial nesting species. In addition as a result of concern expressed relative to the status of the Long-billed Curlew a limited survey was carried out in 1992 and nesting pairs in and adjacent to the study area. These were again monitored in 1993 but no attempt was made to locate nests.



3.1.3 Banding

In order to verify the effects of construction and/or flooding of the dam on the resident Prairie Falcons and Ferruginous Hawks, it was deemed necessary to be able to distinguish residents from migrants or transients of the same species. Since most individuals of both species are virtually identical in size and colour, it was necessary to catch individuals and mark them with an external marking device which could be identified later. Since they were to be most directly affected by the construction and flooding, colour marking was restricted to Prairie Falcons. In 1989 and 1990 Falcons in the study area were banded with standard USF&W numbered aluminum bands together with combinations of red, blue and black coloured bands. In 1991, 1992 and 1993 following the two years of colour banding all young Prairie Falcons and Ferruginous Hawks in the study area have been banded with the standard USF&W aluminum bands.

3.1.4 Disturbance

One of the objectives of the current study has been to determine the effects of disturbance resulting from the construction and flooding of the dam on both Prairie Falcons and Ferruginous Hawks. This is of particular relevance as earlier studies have documented adverse affects on these two species resulting from various types of disturbance (Fyfe and Olendorff 1976, Call 1978, White and Thurow 1985, Grier and Fyfe 1987). From the beginning it has been evident that since several of the Prairie Falcon and Ferruginous Hawk nesting territories encompass areas that are impacted by or adjacent to the dam, it is inevitable that resident birds will be disturbed to a greater or lesser degree by activities associated with construction and/or flooding. Therefore all observed instances of

disturbance and the subsequent behaviour have been documented during the 1989, 1990, 1991, 1992 and 1993 breeding seasons.

3.2 Monitoring the effect of Human Disturbance

In order to determine the effect of human disturbance three priorities were set.

a) The first priority was to locate initial occupancy of nesting species raptors and colonial nesting species. This period is the most critical time for the establishment of territories by raptors and for the initiation of colonization by colonial species.

b) The second priority was to monitor the general biology and natural disturbance affecting the breeding birds so that there will be a basis for comparison and for establishing guidelines. This monitoring was carried out for all sites at regular intervals throughout the breeding season.

c) The third priority was the documentation of interaction with humans regardless of the nature of the interaction. Specifically we attempted to determine the relative response by breeding birds to various types of activities in relation to the time in the birds breeding cycle and in relation to such aspects as distance, timing, duration and nature of the activity.

4.0 RESULTS

4.1 Population Inventory

Prairie Falcons were observed in eleven of thirteen available nesting territories during the 1993 breeding season. One cliff which includes two nesting territories was again occupied by a single male with two females utilizing separate nest sites within that male's territory. Prairie falcons did not attempt to nest in two known territories and were not observed near these territories during the 1993 breeding season.

The flooding of the dam eliminated six nesting sites and the associated nesting habitat, however, four prairie falcon territories are still available on the reservoir itself. All were occupied and two of the four were successful. One site was predated apparently by raccoons and it appears the fourth failed as a result of daily power boat traffic in very close proximity to the nest site. Four additional territories in close proximity to the reservoir were available following the completion the dam, one immediately above the reservoir on the Castle River and three just below the dam on the Oldman River . Prairie falcons were observed at three of the sites and attempted to nest at two of them, both failed apparently due to human activity. A single bird failed to attract a mate at the third site. The fourth site was occupied by Great Horned Owls.

Ferruginous Hawks were observed in five nesting territories outside of limits of the proposed reservoir but within the study area. All five pair occupied territories and nested.

4.1.1 Prairie Falcon Production

Eighteen young Prairie Falcons were produced by four productive pair (Table 1.) for an average of 4.5 young per productive pair, or an average of 1.8 young for ten nesting

TABLE 1. PRAIRIE FALCON BREEDING TERRITORIES

1989, 1990, 1991, 1992, 1993

NEST SITE	PRS	IND	COURT	COP	EGGS	YNG FL
	89 90 91 92 93	89 90 91 92 93	89 90 91 92 93	89 90 91 92 93	89 90 91 92 93	89 90 91 92 93
Old Bridge	Y Y Y Y Y		Y Y Y Y Y	Y Y Y	5 5	4 4 5
Mercury	Y Y Y Y ^a		Y Y		4 4	4 3
Dam ¹	Y	Y	Y			
Buffalo Jump E.	Y Y Y Y Y		Y Y Y	Y Y	5	4 5 4 5 5
Buffalo Jump W.	Y Y Y Y Y		Y Y Y Y Y	Y Y Y Y	3 3 3	
Fairbrother	Y Y Y Y Y		Y Y		5 5	3 3 3 5
Bitango Eagle	Y		Y			4
Bitango Bridge	Y Y		Y			5
Tennessee Creek	Y Y Y	Y			4	4 4
Lang	Y Y Y Y	Y Y	Y Y Y	Y Y	3	1 5
Welsch	Y Y Y	Y	Y Y		4	4 4
Days	Y Y Y		Y	Y	5	2 3
1st Porcupine ^a	Y Y Y Y		Y Y Y	Y		5 4 5 5
Double Ox-bow	Y Y Y	Y	Y		Y ¹	
Horseshoe	Y Y Y Y		Y	Y	5 4	4 4 3 5
Horseshoe#2	Y					2 2
Maloff	Y Y Y Y Y		Y Y	Y	4	3 4 1
Stevick	Y Y	Y Y Y			5	5 5
Castle Dairy	Y Y Y		Y	Y	5 5 5	4 4 4

¹ suspected relocation from former #42² second nest site within an established territory^a pair relocated from Days¹ female observed incubating^a alternate site in same territory

NEST SITE = Names given to known breeding territories

PRS = pairs observed on territory

IND = individual birds observed to remain in a territory

COURT = courtship behaviour observed

COP = copulation observed

EGGS = number observed, most nests not climbed in incubation

YNG FL = number of young known to have fledged

attempts. One nest failed due to predation. It appeared that all of the young were killed by a racoon and all that remained were a few feather shafts in the nest site. Our observations suggest that three pair deserted as a result of human activity in close proximity to the nest sites and two females apparently deserted due to the water entering the nest cavities due to the heavy rains. As in previous years one territory was documented where a single male was observed mating with two females which resulted in two nesting attempts, one was successful in fledging young. As in the two previous years the second female deserted during incubation, however, this year the primary reason appeared to be flooding as a result of the heavy June rains.

4.1.2 Ferruginous Hawk Production

During the current year nine young were produced at three of the five nest sites all of which are located outside of the proposed reservoir (Table 2.). Cold eggs and a dead young suggest that the losses at the other two nests resulted from exposure during the severe rain storms in May and June. We did not record any human disturbance near the nest sites and we did not find any indication of predation. All of the young were light phased birds.

TABLE 2. FERRUGINOUS HAWK BREEDING TERRITORIES 1989, 1990, 1991, 1992, 1993

NEST SITE	PRS 89 90 91 92 93	IND 89 90 91 92 93	COURT 89 90 91 92 93	COP 89 90 91 92 93	YNG FL 88 90 91 92 93
Feedlot	Y	Y		Y	
Highway	Y Y Y Y Y		Y Y Y		3 2 2 3 2
1St Porcupine	Y Y Y Y		Y Y Y	Y Y Y	3 3
Porcupine #2	Y Y Y Y		Y Y Y	Y	3 4 4 4
Porcupine #3	Y		Y		
Porcupine #4	Y Y				2

4.2 Banding and Colour Marking

TABLE 3. 1993 IMMATURE PRAIRIE FALCON BANDING

Location	Male	Female	Date
Days	816-16425 816-16426	987-46327	06-19-93
1st Porcupine	816-16423 816-16424	987-46324 987-46325 987-46326	06-19-93
Buffalo Jump East	816-16421 816-16422	987-46321 987-46322 987-46323	06-19-93
Stevick	816-16427 816-16428	987-46328 987-46329 987-46330	06-19-93

As I was advised that the project will end this year it was felt that the young should only be banded with regular aluminum bands. Twenty six nestling Prairie Falcons were captured and banded using regular USF&W lock on bands (Table 3.). This brings the total to one hundred seventy two Prairie Falcons that have been banded in the past five years with ninety seven colour marked (Table 4.). The total includes the nineteen adults caught and individually marked. All were banded with numbered USF&W bands and those that were colour marked were also given one or more coloured anodized aluminum bands. Young birds in the first two years were banded with a single colour band coded as to the year of production.

Table 1: Summary of Data	
Category	Value
Item 1	100
Item 2	200
Item 3	300
Item 4	400
Item 5	500
Item 6	600
Item 7	700
Item 8	800
Item 9	900
Item 10	1000

The following text is a placeholder for the main body of the document, which contains detailed information and analysis related to the data presented in the table above.

Section 1: Introduction

Section 2: Methodology

Section 3: Results and Discussion

Section 4: Conclusion

Section 5: References

Since the young would not be part of the breeding cohort prior to the flooding of the dam they are marked only so that at some later date it would be possible to determine if recruitment were from this population unit. The primary objective of the banding was to help us to locate and identify individuals that move or are displaced. However, since it is not always possible to catch the breeding birds, each adult bird that we have caught was specifically colour marked so that individuals can be identified in the field by the use of a spotting scope. Incidental to our regular field observations this year we were only able to identify one of the breeding adults by reading the band colour combinations.

Table 4. PRAIRIE FALCON BANDING SUMMARY 1989 - 1993

	Adults		Immatures		Total	Field Identified
	Colour and USF&W	USF&W	Colour and USF&W	USF&W		
1989	13		31		44	
1990	6		47		53	5
1991				31	31	8
1992				26	26	5
1993				18	18	1
Total	19		78	75	172	19

TABLE 5. 1993 IMMATURE FERRUGINOUS HAWK BANDING

Location	Male	Female	Date
Porcupine Ferruginous	788-04406 788-04407 788-04409	788-04408	06-21-93
Highway Ferruginous	788-04404 788-04405		06-21-93
1st Porcupine Ferruginous	788-04401 788-04402	788-04403	06-19-93

It should be noted that it was originally proposed that Ferruginous Hawks nesting within the boundaries of the proposed reservoir would also be individually marked. Unfortunately no Ferruginous have been colour marked as none have nested within the boundaries of the reservoir in the past four years. However, each year they have nested in the study area and in 1991, 1992 and 1993 (Table 5.) all the young in the study area were banded for future reference.

4.3 Disturbance

Each year in the study area all of the breeding pairs of both species were subject to a wide range of natural disturbance and varying degrees of human related disturbance. During the current breeding season, human disturbance was once again a major concern at many of the nesting territories (Table 6.) With the completion of the dam, construction was pretty much limited to work at the camp sites and had little or no effect on the breeding birds.

TABLE 6. PRODUCTIVITY AND DISTURBANCE AT KNOWN PRAIRIE FALCON BREEDING TERRITORIES
FOR 1993

NEST SITE	1985 NEST # (Young et al. 1986	PRODUCTIVE IN 1993	DISTURBANCE
Old Bridge	#48	N	Severe
Mercury	#45	N	Severe
Dam ¹	#42	N	Severe
Buffalo Jump E.	#40	Y	Minimal
Buffalo Jump W. ²		N	Minimal
Fairbrother		N	Minimal
Lang		N	Severe
Days		Y	Moderate
1st Porcupine ^a		Y	Minimal
Double Ox-bow	#18	not occupied	Minimal
Maloff	#12	N	Minimal
Stevick		Y	Moderate
Castle Dairy		not occupied	Minimal

¹ suspected relocation from former #42

² second nest site within an established territory

^a pair relocated from Days

NEST SITE = Names given to known breeding territories

= Corresponds to nest numbers given in earlier reports by Young

PRODUCTIVE = Indicates whether a nest site was productive or not in the 1990 breeding season.

DISTURBANCE = relative level of documented disturbance

In contrast those nest sites just downstream of the dam or on the reservoir were subjected to considerable human interference. Power boats were free to move wherever they wished frequently disturbing nesting birds, also fishermen and picnickers went pretty well anywhere on the banks of the reservoir often choosing to fish or camp near or below active nest sites.

In contrast to 1992 the incidence of disturbance to breeding pairs of Prairie Falcons was greatly increased. Our observations suggest moderate to severe disturbance at all

nesting sites on the reservoir and to those immediately downstream of the dam. These observations further suggest that three pair of prairie falcons and the pair of golden eagles deserted their nests during incubation as a direct result of this disturbance.

As in 1991 severe disturbance was documented the two sites in close association with the dam and also the next site downstream was also subject to increased activity from fishermen. Even though they were not successful it was interesting to note that birds returned to both the Mercury and the Dam nest sites in 1993.

Ferruginous Hawks were observed at four previously occupied territories and also in one new territory in the study area in 1993. Pairs were observed at nests in all four territories early in the season, however only three of the five pair in the study area were successful during the 1992 breeding season. As in the past three years the Ferruginous in the study area have been subjected to little human interference and our observations suggest that their production has not been influenced by disturbance.

4.4 Artificial Nest Utilization

Table 7. summarizes the utilization of the artificial cliff nesting sites since 1989. Seven artificial holes were occupied during the 1993 breeding season, five by Prairie Falcons, and one each by Canada Geese, and Great Horned Owls. Three of the five prairie falcons and both the geese and the owls nested successfully. One pair of falcons deserted due to human interference and the second was lost to predation.

Prior to the 1991 breeding season nineteen nest platforms were constructed and placed on tree stumps in selected sites along the banks of the reservoir or on areas that will become newly created islands with the flooding of the reservoir. In 1993 three platforms

were used successfully one by a breeding pair of Red-tailed Hawks and the others by Canada Geese. In addition Osprey were observed regularly on several platforms throughout May and early June.

Table 7. ARTIFICIAL AND IMPROVED CLIFF NESTING SITES 1989 -1992				
	Artificial holes	Utilized by Prairie Falcons	Utilized by other species	Total Occupied
Available in 1989	15	1	1 Raven 1 Canada Goose	3
Available in 1990	+32 = 47	3	1 Canada Goose 1 G.H.Owl	5
Available in 1991	+3 = 50	4	2 Canada Geese 1 G.H. Owl	7
Available in 1992	50	3	1 Canada Goose 1 G.H. Owl 1 Raven	6
Available in 1993	+1 = 51	5	1 Canada Goose 1 G.H.Owl	7
Total	50	16	12	28

Although we were not able to monitor all of the nest boxes we did document Kestrel pairs using three boxes, and observed Wood Ducks, Barrow's Goldeneye and Hooded Merganser investigating several boxes. Lone drake of all three species were later observed loafing near several boxes suggesting that they did indeed nest in them.

5.0 DISCUSSION

5.1 Prairie Falcons

Prairie Falcons were observed in eleven territories in the 1993 breeding season. Eight territories were occupied by April 1, three additional territories were occupied later in April two by pairs and one by a single bird. Of the ten breeding pairs nine nested but only four succeeded in fledging young. Production was excellent for these few productive pairs. The resulting fledging success of 4.5 young (Table 8.) per successful pair of Prairie Falcons is actually up from previous years and well above what is normally considered good fledging success (3.1 or 3.2 per successful pair as reported in Idaho by Ogden and Hornocker (1977) and the Pawnee Grassland in Colorado by Olendorff (1973)). Unfortunately the overall production is very poor with only four of the ten nesting attempts succeeding. Three of the six nest failures can be directly attributed to human interference.

5.2 Ferruginous Hawks

In 1985 a single pair of Ferruginous hawks was recorded nesting in the area to be impacted by construction activity. After relocating twice, this pair has nested successfully each year since 1989 at a site approximately four kilometres from the dam. In 1990 and 1991 Ferruginous were recorded at two other locations within the study area. Then in 1992 and again in 1993 new pairs established territories and nested within the study area.

In the 1993 field season Ferruginous Hawks were observed in five nesting territories outside of limits of the reservoir but within the study area. Three of the five nested successfully and produced nine young during the current year.

Table 8. Prairie Falcon and Ferruginous Hawk Nesting

Summary 1989 - 1993

	Prairie Falcon Nest Success					Ferruginous Hawk Nest Success				
Year	89	90	91	92	93	89	90	91	92	93
Occupied Territories	15	15	13	12	11	3	3	3	4	5
Nest Attempts	12	15	12	11	10	1	3	2	4	5
Failures	3 ^a	2	4 ^b	4	6 ^d	1	1			2
Successful nests	9	13	8	7	4	1	2	2	4	3
Young Fledged	31	47	31	31	18	3	5	6	12	9
Production per nest attempts	2.58	3.33	2.58	2.81	1.8	1.5	1.66	3	3	1.8
Production per successful pair ^c	3.44	3.85	3.87	4.4	4.5	3	2.5	3	3	3

^a Two of these failures were attributed to human disturbance.^b One of these failures was attributed directly to human disturbance.^c Good Prairie Falcon nesting success as per studies in Idaho and

Colorado = 3.1 to 3.2 per successful pair.

^d Three of these failures were attributed to human disturbance

As in the previous three years our observations during this study indicate that the Ferruginous Hawks within the study area have been subjected to a minimum of human disturbance. We have found no evidence to suggest that human interference has in any way affected the production of these birds during the past four years.

TABLE 9. PRODUCTIVITY AND DISTURBANCE AT KNOWN FERRUGINOUS BREEDING TERRITORIES

1989, 1990, 1991, 1992, 1993

NEST SITE	1985 NEST #	NEST SUCCESS					DISTURBANCE
		1989	1990	1991	1992	1993	
Feedlot		not occupied					Minimal
Highway ¹	#47	Y	Y	Y	Y	Y	Minimal
Porcupine Hill		N	N		Y	Y	Minimal
Porcupine #2		Y	Y	Y	Y	Y	Minimal
Porcupine #3					Y	N	Minimal
Porcupine #4						N	Minimal

¹ suspected relocation from former #42² second nest site within an established territory

NEST SITE = Names given to known breeding territories

= Corresponds to nest numbers given in earlier reports by Young et al 1986

NEST SUCCESS = Indicates whether a nest site was productive or not

DISTURBANCE = relative level of documented disturbance

5.3 Disturbance

In the 1989 report I suggested that next to the actual destruction of nest sites by flooding, the most serious problem for both the Prairie Falcon and the Ferruginous Hawks would probably be disturbance. Unfortunately disturbance has been demonstrated as the most serious problem for these and other sensitive species nesting in the study area.

We have taken every opportunity to document any disturbance that could be associated with the development of the Dam during the past four years. We did not attempt to stop such disturbance when encountered nor to interfere with any observed disturbance. Our observations of the activities and the subsequent results were simply documented and reported. As stated in the 1991 report, in general our observations demonstrate that the Prairie Falcons observed in this study are remarkably adaptable and tolerant to some types

of disturbance. Indeed the most remarkable aspect of the field study has been the tolerance of the Prairie Falcons to many types of disturbance.

As noted, in 1992 human interference was minimal, Ferruginous hawks increased, and for the first time we documented the successful nesting of Golden Eagles in the study area (the same pair deserted during incubation in 1993.) Both of these species are notoriously shy of human activity and have been documented as readily deserting nest sites as a result of disturbance.

Unfortunately observations made this summer once again highlight the problems related to disturbance. Our observations suggest that one pair of nesting Golden Eagles and three pair of nesting prairie falcons deserted during incubation as a direct result of human disturbance.

As stated in earlier reports, we had documented the three desertions during the past three years which in my opinion these came about directly as a result of people and/or heavy equipment approaching to within 20 meters of the nest sites and remaining in the area for extended periods of time. In 1993 alone we recorded three additional desertions directly related to human activity.

Despite these losses I believe the data indicates that the losses could have been avoided and I am equally convinced that such losses can be prevented with a minimum of guidelines and seasonal restrictions relative to human activity in the immediate vicinity of the nest sites.

5.4 Artificial Nest Sites

With the flooding of the reservoir several of the original nest sites were not available at the beginning of the breeding season. However, for those territories where nest sites remained the breeding pairs returned and utilized both natural and artificial holes in their original territories. Other pairs either relocating or returning to the old territories outside of the reservoir utilized two artificial holes for the first time in the study area in 1993. A total of seven artificial holes were occupied during the current breeding season, five by Prairie Falcons, one by Canada Geese and one by a Great Horned Owl.

Three platforms were utilized for nesting in 1993 and several others were utilized as feeding platforms and hunting perches. Ospreys were observed frequently using the poles as perch points in May and early June of the current year.

Wooden nest boxes placed adjacent to the reservoir provided suitable nests for American Kestrels, other hole nesting species, and several species of tree nesting waterfowl. We did not make a serious attempt to monitor all of the nest boxes in the 1993 breeding season. We did document Kestrel pairs at three boxes and we observed lone drake Wood Duck, Hooded Merganser, Common and Barrow's Goldeneye near others. It is probable that all represented nesting females using the boxes.

5.5 Multiple Use Potential

I would like to repeat what I said in my last year's report. Without question the opportunity for multiple use in this area is quite incredible. In addition to water sports and fishing there is a very real potential for the development of Eco-Tourism including lookouts,

hiking trails, and canoe routes. There are few places in Western Canada where it is possible in a single day to observe such species as Long-billed Curlew, Wood Duck, Hooded Merganser, Barrow's Goldeneye and up to ten species of birds of prey including Prairie Falcon, Ferruginous Hawks, Golden Eagle, Richardson's Merlin. The area is an excellent showplace for prairie wildflowers, and wildlife. Several species of mammals are found in the area including a large ungulate population with both Mule and White-tailed Deer, three species of ground squirrel and three carnivores including a healthy badger population. With good management and planning I believe there is an excellent potential for tourism both by the general city dwelling public but also from the increasing nature and environmentally aware naturalists and birdwatchers. The relative inaccessibility of the river valleys prior to the flooding is undoubtedly one of the primary reasons the area has maintained a good population of sensitive and uncommon raptors. As pointed out, in 1992, just one year after construction the abundant food supply and lack of disturbance, allowed both the Golden Eagles, Ferruginous Hawks and a large number of Waterfowl to come into the area and nest successfully. Several loons were observed late in the nesting season and a wide range of colonial waterbirds were present through much of the season both on the reservoir and adjacent ponds.

Unfortunately the results were not as positive in 1993 primarily due to human disturbance resulting from a complete lack of any guidelines or restrictions to protect the nesting birds.

This year's results graphically illustrate the serious nature of such disturbance, however we still have time to turn this around before the next breeding season.

As stated in my 1992 report "It is my opinion the most serious impact on not only the raptors but on any colonial nesting waterfowl or other sensitive colonial nesting birds is yet to come. I believe this impact will come from human disturbance resulting from unrestricted recreational activities on the reservoir. During this past field season we observed fishermen and/or recreational boaters in the reservoir daily since mid-May. Due to the low water levels they were restricted primarily to the reservoir proper and were unable to come into the more isolated river valleys. However as the water levels increased they immediately moved into the valleys to the edge of the flowing water. If these people stay in their boats and away from sensitive areas they do not pose a threat, however with few exceptions they frequently came ashore for one reason or another.

I believe that it is essential that specific regulations and restrictions to access are put in place for at least the Castle River arm for the majority of the breeding season. I am convinced that if unlimited public access is permitted in this area and throughout the reservoir there is a very real possibility that the majority of the more sensitive species will abandon the area. This would to some extent nullify the mitigation work and would result in the loss of the breeding pair of Golden Eagle, several pair of Prairie Falcons, Ferruginous Hawks and Long-billed Curlew and would eliminate the potential for establishing several of the colonial species."

After the results of this year I think there is little doubt that the loss of sensitive species will come about very quickly unless there is a real attempt to set up guidelines and restrictions which will protect these birds from human disturbance during the breeding season.

6.0 RECOMMENDATIONS

1. I recommend that serious consideration be given to setting up guideline which will restrict boating and general public access to specific areas designated as sensitive from January through June 30th each year. It is imperative that this should be done in full consultation with the other Govt. Departments, the local Committee and in cooperation with the local residents. In particular the Castle River (South Arm) of the reservoir is critical. This arm of the reservoir has unique potential for the development of eco tourism and the maintenance of the most threatened avifauna of the entire reservoir. This area presently provides nesting sites for eight species of raptors and with the flooding of the reservoir and the creation of the new islands has attracted several species of colonial birds.³

2. It is apparent that following flooding of the reservoir the majority of the breeding pairs of prairie falcons and other sensitive species have been subjected to increased interaction with humans. Continued monitoring for three to five years following the completion reservoir is essential to determine a) the results of the mitigation and b) the effect of recreational activities on birds of prey, colonial birds and other designated species

³ In 1992 and 1993 nesting birds of prey in this arm alone included: 3 pair of Prairie Falcons, 1 pair of Golden Eagle, 4 pair of Red-tailed Hawks, 2 pair of Swainson's Hawks, 1 pair of Richardson's Merlins, 3 pair of American Kestrel, 3 pair of Northern Harrier, 1 pair of Long-eared Owl, and 1 pair of Great Horned Owl. The following colonial species were observed on the reservoir and if left undisturbed could set up breeding colonies.: Western Grebe, Eared Grebe, Double Crested Cormorant, White Pelican, California Gull, Ring-billed Gull, Common Tern, and Black Tern. In 1993 Western Grebes attempted to set up a nesting colony on the reservoir. In addition some of the more interesting species observed in the area this year included 3 pair of Long-billed Curlew, Marbled Godwit, 6 of Common Loons, breeding pairs Wood Duck, Hooded Merganser, Barrows and Common Golden-eye, 200+ Canada Geese, 400+ Mallard Ducks, and several sightings of Osprey and Bald Eagle.

such as the Long-billed Curlew. It is possible indeed likely that many of the species which were mitigated for will be lost as a direct consequence of increased human disturbance resulting from recreational activities on the reservoir. I would also like to suggest that the department should capitalize on the 19 years of accumulated data on this population of birds. These data provide the basis to:

- a) evaluate the effects of disturbance,
- b) to better understand the significance of habituation, and
- c) to contribute to realistic guidelines for future construction and recreational projects.

In the light of the increased environmental concern by the public and environmental groups I believe that this is a unique opportunity to develop realistic guidelines for mitigating problems associated with future projects which have the potential for adversely affecting the environment.

3. Where possible, it would be desirable to coordinate planned recreational activities to minimize disturbance and maximize the recreation and educational potential of the breeding raptors and colonial species.

4. Consideration should be given to drafting guidelines and realistic recommendations for future environmentally sensitive projects, relative to the effects of construction and related disturbance on Prairie Falcons and other raptors. Our observations indicate that with a few exceptions, Prairie Falcons in particular are very tolerant of a wide variety of disturbances. Our findings support and parallel those made in the recent study in Idaho by Holthuijzen (1989). On the strength of these data, I think that realistic

recommendations can be drafted relative to the potential effects of construction activities on breeding Prairie Falcons and other raptor species.

5. I recommend the establishment of an observation shelter and information board in one of the recreational areas, where the public can observe the Prairie Falcons, Osprey or Red-tailed Hawks through spotting scopes.

6. I recommend the establishment of information centres and/or displays in Pincher Creek, Cowley, and in a Public Lookout to inform the public of the raptor and wildlife mitigation work that is being carried out in association with the dam.

3.3 Develop Realistic Guidelines and Regulations to Protect Sensitive Species

As indicated in my project proposal I am prepared to sit down with residents of the area, committees, or Govt. authorities, to develop guidelines for the protection of these birds. I believe that if guidelines and regulations are going to be effective for the protection of these birds it is essential that they be realistic and recognize the legitimate interests of others. While most would agree it would be desirable to protect 100% of the vulnerable species, I believe that regulations must be realistic or it is also possible to lose everything. In order to develop table guidelines and regulations it is necessary to have good data on the breeding biology and sensitivities for the species of concern as well as specific documentation of problems and conflicts.

In order to keep this all in perspective, I suggest that it is desirable to work with other agencies and to obtain data relative to recreational use of the reservoir in general

during the breeding season⁴. With such information in hand it will then be possible to provide the necessary parameters which can be applied to guidelines and regulations for the particular situation. It is only in this way that it is possible to discuss guidelines with other disciplines and come up with decisions which are realistic and meet most of the needs of everyone concerned.

3.4 Public Information and Involvement

For the reasons identified above ie. (in light of environmental concerns, public interest and the political pressures relative to this particular project) every effort was made to keep the public informed about this project and its purpose. As with the mitigation work it is clear that whatever is done will be surrounded by some controversy and as before I believe the best defense is a well informed public. The excellent cooperation with the local committee must be continued and where possible public relations in general should be expanded through presentations to the local schools, clubs etc. and direct involvement in the project should be encouraged where possible.

This project is well suited to both good public relations and involvement as a result of the high profile and general public interest in falcons and birds of prey in general and because of the highly visible and appeal of colonial waterbirds. This interest can and should be fostered. Some suggestions to achieve this are as follows:

⁴ The breeding season being considered as late March through the end June to accommodate the species of concern.

- a) Presentations to the public and in particular to school children relative to birds of prey and colonial waterbirds with specific emphasis on the sensitive nature of each in the nesting areas.
- b) Public information displays in the area and at such locations as the Information Centre at the Dam and at such tourist attractions in the area such as "Head Smashed In Buffalo Jump".
- c) Establishment of an observation shelter complete with spotting scopes at one of the more visible nesting locations. This shelter should be well supplied with suitable literature and PR materials and if possible manned during the breeding season and should be provided with suitable information on the life history of the birds and relative to the aims and scope of the project.

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Appendix 1. Summary of Oldman Prairie Falcon Nest Data

OLDMAN RIVER NEST OCCUPANCY 1968 - 1993																				
	68	69	70	71	72	73	74	75	76	77	78	80	85	86	87	89	90	91	92	93
OB	F	F	O	F	F	F							F	F	F	S	F	F	F	F
ME	F	F	F	S		F		F	F	F	F	F	F	F	F	F	F	F		F
DAM			F	F			F				F	F	S	S		F		O		S
BJE	F	F					F		F	F	F	S	F	F	F	F	F	F	F	F
BJW														U	U	F	F	F	F	F
BBR													F	F	F	F	F	O		
BEA														U	U		F			
TEN														U	U	S	F	F	F	
LAN	F	F	O	O	O	O	O	O	O	O	O			U	U	F	F	F	S	F
WEL					F	F	O	F	O	F	F		F	U	U	F	F	F	S	
HO1							F	F	F	F	S		F	U	U	F	F	F	F	
HO2																	F			
MAL							F	F	F	F			F	U	U	F	F	F	F	F
CD																F	F	F	O	O
STE																	S	S	F	F
DAY																F				F
1P																	F	F	F	F
DOX													F			F		F	S	
FA		F	F	F	F	F	F	F	F	F	F	F	U			F	F	F	F	F

# F	4	5	3	4	2	4	5	5	5	6	6	4	8	5?	4?	15	13	13	12	10
#S						1					1	1	1	1			3	1	3	1
# O			2	1	1	1	2	1	2	1	1							2	1	1

F - Pair of Prairie Falcons on territory

S - A single Prairie Falcon on territory

O - Pair of Great Horned Owls nesting in the territory

APPENDIX 3. Birds identified in the study area 1989-93

Western Grebe *Aechmophorus occidentalis*
 Red-necked Grebe *Podiceps grisegena*
 Eared Grebe *Podiceps caspicus*
 Horned Grebe *Podiceps auritus*
 Double-crested Cormorant *Phalacrocorax auritus*
 Great Blue Heron *Ardea herodias*
 Whistling Swan *Cygnus columbianus*
 Trumpeter Swan *Cygnus buccinator*
 Canada Goose *Branta canadensis*
 Snow Goose *Chen hyperborea*
 Mallard *Anas platyrhynchos*
 Gadwall *Anas strepera*
 Northern Pintail *Anus acuta*
 Green-winged Teal *Anas carolinensis*
 Blue-winged Teal *Anas discors*
 Cinnamon Teal *Anas cyanoptera*
 American Widgeon *Mereca americana*
 Shoveler *Spatula clypeata*
 Wood Duck *Aix sponsa*
 Canvasback *Aythya valisineria*
 Ring-neck Duck *Aythya collaris*
 Lesser Scaup *Aythya affinis*
 Barrow's Goldeneye *Bucephala islandica*
 Common Goldeneye *Bucephala clangula*
 Bufflehead *Bucephala albeola*
 White-winged Scoter *Melanitta deglandi*
 Ruddy Duck *Oxyura jamaincensis*
 Common Merganser *Mergus merganser*
 Red-breasted Merganser *Mergus serrator*
 Hooded Merganser *Lophodytes cucullatus*
 Soar Rail *Porzana carolina*
 American Coot *Fulica americana*
 Killdeer *Charadrius vociferus*
 Greater Yellowlegs *Tringa melanoleuca*
 Spotted Sandpiper *Actitis macularia*
 Marbled Godwit *Limosa fedoa*
 Willet *Catoptrophorus semipalmatus*
 Wilson Phalarope *Phalaropus tricolor*
 Long-billed Curlew *Numenius americanus*
 California Gull *Larus californicus*
 Ring-billed Gull *Larus delawarensis*
 Common Tern *Sterna hirundo*

Black Tern *Chlidonias niger*
 Sharp-shinned Hawk *Accipiter striatus*
 Cooper Hawk *Accipiter cooperii*
 Goshawk *Accipiter gentilis*
 Red-tailed Hawk *Buteo jamaicensis*
 Swainson Hawk *Buteo swainsoni*
 Rough-legged Hawk *Buteo lagopus*
 Ferruginous Hawk *Buteo regalis*
 Golden Eagle *Aquila chrysaetos*
 Bald Eagle *Haliaeetus leucocephalus*
 Northern Harrier *Circus cyaneus*
 Osprey *Pandion haliaetus*
 Prairie Falcon *Falco mexicanus*
 Peregrine Falcon *Falco peregrinus*
 Richardson's Merlin *Falco columbarius richardsoni*
 American Kestrel *Falco spawerius*
 Grey Partridge *Perdix perdix*
 Mourning Dove *Zenaida macroura*
 Rock Dove *Columa livia*
 Great Horned Owl *Bubo virginianus*
 Short-eared Owl *Asio flammeus*
 Long-eared Owl *Asio otis*
 Burrowing Owl *Athene cunicularia*
 Common Nighthawk *Chordeiles minor*
 Ruby-throated Hummingbird *Archilochus colubris*
 Belted Kingfisher *Ceryle alcyon*
 Common Flicker *Colaptes cafer*
 Hairy Woodpecker *Dendrocopos villosus*
 Downy Woodpecker *Picoides pubescens*
 Yellow-bellied Sapsucker *Sphyrapicus varius*
 Eastern Kingbird *Tyrannus tyrannus*
 Western Kingbird *Tyrannus verticalis*
 Say's Phoebe *Sayornis saya*
 Western Wood Pewee *Contopus sordidulus*
 Least Flycatcher *Empidonax minimus*
 Horned Lark *Eremophila alpestris*
 Tree Swallow *Tachycineta bicolor*
 Northern Rough-winged Swallow *Stelgidopteryx serripennis*
 Bank Swallow *Riparia riparia*
 Barn Swallow *Hirundo rustica*
 Cliff Swallow *Petrochelidon pyrrhonota*
 Common Raven *Corvus corax*
 Common Crow *Corvus brachyrhynchos*
 Black-billed Magpie *Pica pica*

Gray Jay *Perisoreus canadensis*
 Clarkes Nutcracker *Nucifraga columbiana*
 Black-capped Chickadee *Parus atricapillus*
 Red-breasted Nuthatch *Sitta canadensis*
 Rock Wren *Salpinctes obsoletus*
 House Wren *Troglodytes aedon*
 Catbird *Dumetella carolinensis*
 American Robin *Turdus migratorius*
 Veery *Hylocichla fuscescens*
 Mountain Bluebird *Sialia currucoides*
 Ruby-crowned Kinglet *Regulus calendula*
 Sprague's Pipit *Anthus spragueii*
 Bohemian Waxwing *Bombycilla garrulus*
 Cedar Waxwing *Bomycilla cedrorum*
 Northern Shrike *Lanius excubitor*
 Starling *Sturnus vulgaris*
 Yellow Warbler *Dendroica petechia*
 Common Yellowthroat *Geothlypis trichas*
 Yellow-rumped Warbler *Dendroica coronata*
 Red-winged Blackbird *Agelaius phoeniceus*
 Yellow-headed Blackbird *Xanthocephalus xanthocephalus*
 Brewers Blackbird *Euphagus cyanocephalus*
 Western Meadowlark *Sturnella neglecta*
 Common Grackle *Quiscalus quiscula*
 Brown-headed Cowbird *Molothrus ater*
 Vesper Sparrow *Pooecetes gramineus*
 Savannah Sparrow *Passerculus sandwichensis*
 Clay-colored Sparrow *Spizella pallida*
 Dark-eyed Junco *Junco hyemalis*
 Pine Siskin *Spinus pinus*
 American Goldfinch *Spinus tristis*

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